

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2003/001439

## A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. 7: H04B 10/17, H01S 3/102

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI, JAPIO      Keywords: (i) vcSEL, vertical cavit; amplif; pump  
(ii) optic; amplif; H04B 10/17; pump, signal; power, intensit, gain; adjust, control, feedback, chang

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	US 2003/0112498 A (Nikonov et al.) 19 June 2003 Paragraphs 17-23, Figure 3	1-4, 6, 12-14
X	WO 2001/067563 A (NOVALUX, INC.) 13 September 2001 Pages 3, 19-20, claims 29-31	1-2, 4, 6-7, 10-18 19, 21
Y		
X	US 5301201 A (DUTTA et al.) 5 April 1994 Columns 2-4, Figure 4	1-2, 4-7, 10- 17 19, 21
Y		

 Further documents are listed in the continuation of Box C See patent family annex

* Special categories of cited documents:	
"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 16 January 2004	Date of mailing of the international search report 22 JAN 2004
Name and mailing address of the ISA/AU <b>AUSTRALIAN PATENT OFFICE</b> PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer <b>MICHAEL HALL</b> Telephone No : (02) 6283 2474

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## C (Continuation).

## DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0027706 A (PARK et al.) 7 March 2002 Page 2, Figure 1	30
Y		19, 21
Y	US 6407854 B (SHUM) 18 June 2002 Column 5 line 67 - column 6 line 8	19, 21
A		30, 32

NOTE: for the Y indications, either of WO 2001/067563 and US 5301201 may be combined with either of US 2002/0027706 and US 6407854.

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**Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos :

because they relate to subject matter not required to be searched by this Authority, namely:

2.  Claims Nos :

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3.  Claims Nos :

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

**Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims 1-29, 31
2. Claims 30, 32

as reasoned on the extra sheet.

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

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**Supplemental Box**

(To be used when the space in any of Boxes I to VIII is not sufficient)

**Continuation of Box No: II**

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claims 1-29, 31 are directed to an optical amplifier wherein pump beams are generated by a vertical cavity surface emitting laser. It is considered that the *use of a vertical cavity surface emitting laser to generate the pump beams* comprises a first "special technical feature".
2. Claims 30, 32 are directed to a method of controlling optical amplifier gain, by processing signals related to measured signal and pump powers to generate a corresponding pump source driving profile. It is considered that *processing signals related to measured signal and pump powers, to generate a corresponding pump source driving profile*, comprises a second "special technical feature".

The feature common to all of the claims is an optical amplifier having a pump source, with amplification of signals via stimulated emission induced by pump beams. However this common feature is generic in the art of fibre amplifiers. Consequently the common feature does not constitute "a special technical feature" within the meaning of PCT Rule 13.2, second sentence, since it makes no contribution over the prior art. Since there exists no other common feature which can be considered as a special technical feature within the meaning of PCT Rule 13.2, second sentence, no technical relationship within the meaning of PCT Rule 13 between the different inventions can be seen. Consequently it appears that *a posteriori*, the claims do not satisfy the requirement of unity of invention.

Furthermore, the groups of claims include distinct classifications under the IPC (eg, H01S 5/183 in relation to the first group of claims, and H01S 3/102 in relation to the second group of claims) and therefore constitute separate search areas, and hence these inventions could not be searched without involving significant extra effort.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no-way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
US	2003112498	WO	03052887		
WO	0167563	AU	60997/01	EP	1264374
US	5301201	EP	0614256	JP	6318765
US	2002027706	EP	1187275	JP	2002118316
US	6407854	AU	41646/01	EP	1264372
					KR 2002019688
					WO 0167141

END OF ANNEX